401 KAR 6:310. Water supply well construction practices and standards.

RELATES TO: KRS 223.400 - 223.460, 223.991, 224.1-010, 224.1-400

STATUTORY AUTHORITY: KRS 223.420(1)(e), 223.435, 224.10-100, 224.70-100, 224.70-110

NECESSITY, FUNCTION AND CONFORMITY: KRS 224.10-100, 224.70-100, and 224.70-110 authorize the cabinet to establish administrative regulations to protect water quality. KRS 223.435 requires the cabinet to promulgate administrative regulations establishing standards of practice for water well construction. This administrative regulation provides minimum standards and requirements for construction, modification, and abandonment of water supply wells.

Section 1. General Requirements. (1) Each water supply well subject to this administrative regulation shall be constructed, modified, or abandoned only by a certified water supply well driller or certified well driller assistant as established in KRS 223.425 and 401 KAR 6:320.

(2) A water supply well driller's assistant shall work under the "direct supervision", as defined by 401 KAR 6:001(14), of a certified water supply well driller.

(3) Well specifications shall be:

(a) Provided by the certified well driller to the well driller's assistant under "direct supervision" as defined by 401 KAR 6:001(14), for the work to be conducted including:

1. Construction;
2. Alteration;
3. Maintenance;
4. Repair;
5. Reworking;
6. Development;
7. Abandonment; or
8. Plugging; and

(b) Recorded on the Uniform Kentucky Well Construction Record, which shall be:

1. Retained by the water supply well driller's assistant; and
2. Available for inspection upon request by the cabinet.

(4) Changes made to water supply well specifications during any work being conducted on a water supply well shall be:

1. Approved in advance by a certified waters supply well driller;
2. Recorded on an amended Uniform Kentucky Well Construction Record;
3. Retained by the water supply well driller's assistant; and
4. Available for inspection upon request by the cabinet.

(5) Permanent and temporary water supply wells shall be constructed, modified, and abandoned in a manner that prevents the introduction or migration of contamination to a water-bearing zone or aquifer through the casing, drill hole, or annular materials.

(6) Within sixty (60) days after a water supply well has been completed, modified, or abandoned, the certified water supply well driller shall submit to the cabinet the Uniform Kentucky Well Construction Record or the Uniform Kentucky Well Maintenance and Plugging Record, as appropriate. The report shall include:

(a) All information about the depth and the materials used in the water supply well construction, modification, or abandonment; and

(b) The results of the bacteriological sampling as established in Section 9(6) of this administrative regulation.

(7) Records to water supply well owner. Within sixty (60) days after the water supply well

has been completed or modified, the certified water well driller shall provide to the well owner a copy of the:

(a) Uniform Kentucky Well Construction Record or the Uniform Kentucky Well Maintenance and Plugging Record submitted to the cabinet;

(b) Results of bacteriological sample analysis collected in accordance with Section 9(6) of this administrative regulation;

(c) Water Well Owner's Guide; and

(d) Analytical results if additional water quality analysis is conducted.

(8) Each well constructed or modified shall be tagged with a well identification number tag provided by the cabinet.

(a) An existing well identification number shall be included on the Uniform Kentucky Well Maintenance and Plugging Record for any well being modified or abandoned.

(b) If a well identification number does not exist at the time of modification or abandonment, the well shall be tagged and the well identification number assigned shall be recorded on the Uniform Kentucky Well Maintenance and Plugging Record.

(9) Variances. If conditions exist or are believed to exist that preclude compliance with the requirements established in this administrative regulation, the certified water supply well driller may request a variance prior to well construction, modification, or abandonment. The variance request shall be submitted to the cabinet on the Kentucky Water Well Variance Request form.

(a) The variance request shall include:

1. A thorough description of the land use at the site and adjacent properties;

2. The distance between the proposed well location and existing water supply wells and monitoring wells on adjacent properties;

3. The distance between the proposed well location and potential pollution sources, both on site and on adjacent properties, including septic systems, sewers, and petroleum and chemical storage tanks;

4. A description of the geologic conditions at the site, including soil thickness, type of bedrock, perched water, confining zones, and the depth to groundwater;

5. A summary of the provisions, including the section numbers of this administrative regulation, for which the variance is requested;

6. A justification for the variance; and

7. a. The proposed well construction procedures to be used in lieu of compliance with this administrative regulation; and

b. An explanation of how the alternate well construction procedures ensure the protection of the quality of the groundwater and the protection of public health and safety.

(b) Written variance procedure.

1. The certified water supply well driller shall request a variance by submitting to the cabinet a Water Well Variance Request form signed by the certified water supply well driller and water supply well owner, and shall obtain written cabinet approval before well construction begins.

2. The cabinet shall notify the applicant in writing within ten (10) days of its decision to either grant or deny the variance.

3. The cabinet shall not issue a variance if the proposed water supply well construction will not ensure the protection of groundwater quality and public health and safety.

(c) Verbal variance for an emergency.

1. A certified water supply well driller may request a verbal variance for an emergency if the delay incurred due to the written variance procedure in paragraph (b) of this subsection could result in:

a. Loss of access to potable water for the intended user;

b. Failure to address an existing or impending environmental emergency in accordance with KRS 224.1-400; or

c. A risk to public health or safety.

2. The cabinet shall not issue a variance for an emergency if the proposed water supply well construction will not ensure the protection of groundwater quality and public health and safety.

3. Within fifteen (15) days of the date the cabinet approves the verbal variance for an emergency, the certified water well driller shall submit to the cabinet a Kentucky Water Well Variance Request form signed by the certified water supply well driller and water supply well owner.

(d) The variance approval shall list the conditions of the variance, including the:

1. Approved alternate well construction procedures;

2. Well sampling requirements; and

3. Requirement to notify surrounding property and well owners of the variance, if applicable.

(e) Within sixty (60) days of completing the well, the certified water supply well driller shall submit to the cabinet a copy of the Kentucky Water Well Variance Request form signed by the certified water supply well driller and the water supply well owner.

(f) 1. After a variance is issued regarding the location of a well with respect to various pollution sources as established in Section 5(1) of this administrative regulation, water samples from the well shall be collected and analyzed for the parameters stated in the variance approval issued by the cabinet.

2. The certified water well driller shall submit a copy of the analytical results on the Water Well Bacterial Report and Chain of Custody form to the well owner and the cabinet within ten (10) days of the receipt of the analytical results from the laboratory.

Section 2. Construction Materials and Requirements. (1) All materials used for the construction, modification, or abandonment of water supply wells shall be approved for use in water wells by the:

(a) National Sanitation Foundation (N.S.F.);

(b) American Society for Testing and Materials (A.S.T.M.); or

(c) American Petroleum Institute.

(2) Permanent well casing and liners.

(a) Well casing and liners shall be able to withstand the physical forces acting upon them during and following their installation and during their use including forces:

1. Due to suspension in the borehole, grouting, development, purging, pumping, or sampling; and

2. Exerted on the well casing and liners by the surrounding geologic materials.

(b) Steel or PVC well casing and liners shall have a minimum inside diameter of four (4) inches, except for driven point wells and jetted wells as established in Section 8(3) of this administrative regulation.

(c) Well casing and liners shall be installed in accordance with manufacturer specifications.

(d) Used, damaged, or contaminated well casing or liner pipe shall not be installed.

(e) Steel well casing and liners.

1. Steel well casing and liners shall meet or exceed the minimum standards established in Table A of this administrative regulation.

Table A: Casing and Liner Pipe Weights and Dimensions			
Size (inch-	External Di-ameter	Thickness (inches)	Weight (pounds per

es)	(inches)		foot)
4	4.500	0.188	8.66
5	5.563	0.188	10.79
6	6.625	0.188	12.92
8	8.625	0.277	24.70
10	10.750	0.307	34.24
12	12.750	0.330	43.77
14	14.000	0.375	54.57
16	16.000	0.375	62.58
18	18.000	0.375	70.59
20	20.000	0.375	78.60

2. Joints and couplings shall be welded or threaded.

3. Joints shall be watertight.

(f) PVC well casing and liners.

1. PVC well casing and liners shall:

a. Meet the minimum standards established in Table B of this administrative regulation;

Table B: PVC Casing and Liner Pipe Specifications			
Size (inches)	SDR	External Diameter (inches)	Minimum Wall (inches)
4	26	4.500	0.173
5	26	5.563	0.214
6	26	6.625	0.255
8	26	8.625	0.332
10	26	10.750	0.413
12	26	12.750	0.490
14	26	14.000	0.539
16	26	16.000	0.616

b. Have a minimum Impact Classification of IC-1 in accordance with A.S.T.M. Standard F480-14; and

c. At a minimum, meet:

(i) A.S.T.M. Specification D1784-11 or F480-14 found in A.S.T.M. Specification D1784-11, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds and A.S.T.M. Specification F480-14, Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80;

(ii) N.S.F. Standard 14-2018 for potable water applications found in N.S.F. Standard 14-2018, Plastics Piping System Components and Related Materials; and

(iii) N.S.F. Standard 61-2018, Drinking Water System Components – Health Effects.

2. Joints and couplings shall be welded, cemented, or threaded.

3. Joints shall be watertight.

4. PVC casing shall not be driven or pushed by force of the rig, either by direct hydraulic force or by hammer.

(3)(a) Temporary outer casing. Temporary outer casing used during well construction shall be sufficiently strong to permit installation without distorting or rupturing, and shall be removed upon well completion.

(b) If temporary outer casing is to be used as permanent outer casing, the temporary outer casing shall be grouted in place.

(4) Well screens.

(a)1. Well screens shall be capable of withstanding the stress to which the pipe will be subjected and the corrosiveness of the water with which it comes in contact.

2. Used, damaged, or contaminated well screens shall not be installed.

(b) Steel or PVC well screens with a minimum inside diameter of four (4) inches shall be installed, except for bored, driven, or jetted wells.

(c) Well screens shall be:

1. Installed in accordance with the manufacturer's specifications; and

2. Centered in the borehole.

(d) Steel screens. Joints and couplings shall be welded or threaded.

(e)PVC screens shall:

1. Have minimum Standard Dimension Ratio (SDR) 26;

2. Have a minimum Impact Classification of IC-1 in accordance with A.S.T.M. Standard F480-14;

3. At a minimum, meet:

a. A.S.T.M. Specification D1784-11 or F480-14 found in A.S.T.M. Specification D1784-11, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds and A.S.T.M. Specification F480-14, Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80; and

b. N.S.F. Standard 14-2018 for potable water applications found in N.S.F. Standard 14-2018, Plastics Piping System Components and Related Materials and rated potable water (PW) or well casing (WC); and

4.. Joints and couplings shall be welded, cemented, or threaded.

(f) Screen slot size shall be selected to prevent the entry of sediment or other harmful material into the well.

(5) Air rotary drilling. Water shall be injected into the air stream at a rate sufficient to eliminate dust and to keep the borehole clean of cuttings.

(6) Mud rotary drilling. Pits to contain or re-circulate drilling fluids shall be constructed in a manner as to isolate the drilling fluid from runoff to a stream or other waterway.

(7) Materials containing lead shall not be used in the construction of a water supply well.

Section 3. Sealing Materials. (1) Sealing materials and additives that control or affect setting times or physical properties of the sealing materials shall be mixed in accordance with the manufacturer’s specifications.

(2) Application. Grouting shall be performed using the grout-pipe method or a pressure grouting device to add the sealing materials and other materials used to seal the annulus from the bottom of the annulus upward in one (1) continuous operation until the annulus is filled to two (2) feet below the surface or to the point of pitless adapter attachment. If temporary or permanent outer casing is used, sealing materials shall be added prior to installing the inner casing.

(a) Cement and concrete grout. The appropriate type of neat cement and concrete grout for the conditions present in the well shall be used in accordance with the manufacturer’s specifications and this subsection.

(b) Neat cement-bentonite grout. Neat cement-bentonite grout shall set for a minimum of seventy two (72) hours prior to resuming drilling operations.

(c) Bentonite grout.

1. Bentonite grout shall set until the slurry has hydrated according to the manufacturer's specifications.

2. Bentonite grout shall not be used if chlorides in groundwater exceed 1,000 parts per million (ppm).

(d) Reduced setting time. Setting time may be reduced with additives if used in accordance with the manufacturer's specifications.

(e) Bentonite in pellet, chip, or granular form.

1. If bentonite pellets, chips, or granules are placed above the water table:

a. Dry bentonite pellets, chips, or granules shall be placed in increments not greater than two (2) feet in thickness to provide proper hydration and prevent bridging; and

b. Each increment shall be hydrated prior to the continued placement of dry bentonite pellets, chips, or granules.

2. Bentonite pellets, chips, or granules shall not be used if chlorides in groundwater exceed 1,000 parts per million (ppm).

(f) Construction water. Water used in the drilling or decontamination process shall be potable.

(g) 1. Drill cuttings. Clay, shale, or limestone drill cuttings may be used if cuttings are allowed to seal portions of the annulus.

2. Sandstone cuttings shall not be used.

Section 4. Design Factors. Each well shall be constructed to include:

(1) Natural protection. The well shall be located to protect groundwater quality and public health and safety;

(2) Geologic formations.

(a) The well construction shall be adapted to the local or site-specific geologic formations and groundwater conditions.

(b) Undesirable groundwater shall be cased off or otherwise prevented from contributing to a well;

(3) Capacity. The well shall be constructed to optimize yield while maintaining the safe functioning and integrity of the aquifer;

(4) Pitless well adapters.

(a) A well casing shall not be cut off or cut into below finished ground surface except to install a pitless well adapter, a pitless well unit, or to make modifications.

(b) Construction or installation of pitless well adapters or pitless well units shall provide a leak-proof seal. If a frost-free hydrant is installed, a Double Check Valve Backflow Preventer that meets the specifications of American Society of Sanitary Engineering (A.S.S.E.) 1015-2011 Performance Requirements for Double Check Backflow Prevention Assemblies shall be installed between the pitless adapter and the frost-free hydrant;

(5) Flowing artesian wells. A flowing artesian well shall be constructed to:

(a) Maintain the head pressure within the aquifer; and

(b) Prevent an uncontrolled discharge of groundwater into the environment; and

(6) The well shall be constructed to allow access for repairs, maintenance, treatment, and inspection.

Section 5. Setback requirements. (1) Wells shall be installed with the minimum lateral distances between the well and potential pollution sources established in Table C of this administrative regulation.

Table C: Setback Requirements	
Lateral Sources of Contamination	Minimum Distances
Leaching Pit	100 Feet
Petroleum Storage Tank	100 Feet
Grave or Cemetery	75 Feet
Manure Pile, Animal Waste Stor- age, or Confined Animal Feeding Operation	75 Feet
Wastewater Treatment Disposal System	75 Feet
Side Wall of Lateral Trench, Bed, or Lagoon	70 Feet
Geothermal – Closed Loop, Ungrouted	70 Feet
Water Supply Well	50 Feet
Septic Tank or Sewer Line	50 Feet
Livestock Pen, Corral, or Stable	50 Feet
Surface Water Body	25 Feet
Geothermal – Closed Loop, Grouted; Abandoned Water Well Grouted	20 Feet
Property Lines, Utility Lines, or Roadway Right of Way	10 feet

(2) The certified water supply well driller shall evaluate land-use activities, both on the property on which the well is to be located and on adjacent properties, and identify other potential pollution sources not listed subsection (1) of this section.

(3) If the unconsolidated material is less than twenty (20) feet thick and composed of predominantly sand or gravel, the minimum lateral distances established in subsection (1) of this section shall be doubled.

(4) A well may be constructed in an identified special flood hazard area if an alternate site does not exist.

(5) The casing shall be terminated:

(a) A minimum of two (2) feet above the highest base flood elevation at the site; and

(b) Any known conditions of flooding by drainage or run-off from the surrounding land.

(6) The well extended vertically shall clear a projection from a building by a minimum of five (5) feet.

(7) Wells shall not be constructed in pits or basements.

Section 6. Wells Drilled into Consolidated Formations Using the Cable Tool, Air Rotary, Mud Rotary, Reverse Rotary, or Sonic Methods. (1) Borehole construction.

(a) The diameter of the borehole shall be a minimum of 1.75 inches greater than the outer diameter of the casing.

(b) Steel casing may be driven or advanced through unconsolidated material without overdrilling using the dry-driven grout method in accordance with Section 8(2) of this administrative regulation.

(c) The borehole diameter of the open-hole portion of the well shall be smaller than the inside diameter of the lowermost permanent casing so that the:

1. Permanent casing can rest on the shoulder of the open borehole; and

2. Lower portion of the permanent casing can be properly sealed.

(d) Plumbness and alignment. The borehole shall:

1. Be sufficiently plumb and straight to receive well casing, liner, and screen without binding; and

2. Not interfere with the installation and operation of the pump.

(2) Casing installation.

(a) Casing shall extend below the surface a minimum of twenty (20) feet.

(b) Single-cased wells.

1. If unconsolidated material is thirty (30) feet thick or less, the casing shall be installed to extend a minimum of ten (10) feet into bedrock.

2. If unconsolidated material is greater than thirty (30) feet thick, the casing shall be installed to extend a minimum of two (2) feet into bedrock.

3. Permanent casing shall be installed a minimum of two (2) feet below any fractures, crevices, voids, or undesirable geologic formations that may introduce harmful materials, pollutants, or undesirable groundwater to the well.

4. Undesirable water-bearing formations shall be cased off leaving a minimum of two (2) feet below the bottom of the production zone.

(c) Multiple-cased wells.

1. Temporary outer casing shall:

a. Have an inside diameter a minimum of two (2) inches greater than the outside diameter of the inner casing;

b. Be removed prior to well completion; and

c. If temporary outer casing is to be used as permanent outer casing, the temporary outer casing shall be grouted in place.

2. The inside diameter of permanent outer casing shall be a minimum of two (2) inches greater than the outside diameter of the inner casing.

3. Permanent inner casing shall be installed in accordance with the requirements established in subsection (2)(b) of this section.

(3) Screen and liner installation.

(a) Screen or liner slot size shall prevent the entry of fine-grained sediment and other anticipated harmful material into the well.

(b) Screens and liners shall conform to the requirements established in Section 2 of this administrative regulation.

(4) Filter pack.

(a) An artificial filter pack shall:

1. Be of a size that works in conjunction with the well screen to prevent the entry of fine material and sediment into the well;

2. Be disinfected prior to placement in the well or shall be disinfected in the well; and

3. Extend a minimum of two (2) feet above the screen.

(b) Filter pack refill pipes may be installed if refill pipes:

1. Terminate above finished ground surface;

2. Are provided with a watertight cap; and

3. Are sealed in the annulus.

(5) Annular seal.

(a) The annulus shall be sealed in a manner that prevents the migration of pollutants through the annulus and by:

1. Sealing the entire annulus with sealing materials;

2. Sealing a minimum of the bottom two (2) feet of the annulus between the borehole and the permanent casing and sealing the remainder of the annulus with impervious drill cuttings, sealing materials, native clay, or a combination of these materials; or

3. Using the methods in subparagraphs 1 or 2 of this paragraph in combination with a mechanical packer.

(b) Single-cased wells.

1. Open-hole construction.

a. The bottom two (2) feet of the annulus shall be sealed with sealing materials; and

b. The remainder of the annulus shall be filled with drill cuttings, sealing materials, native clay, or a combination of these materials.

2. Screened construction.

a. The bottom two (2) feet above the filter pack shall be sealed with sealing materials; and

b. The remainder of the annulus shall be filled with drill cuttings, sealing materials, native clay, or a combination of these materials.

(c) Multiple-cased wells.

1. Temporary outer casing.

a. The annulus shall be sealed below the temporary outer casing prior to removal of the temporary outer casing; and

b. The remainder of the annulus shall be filled in the zone where temporary outer casing was used upon removal of the temporary outer casing.

2. Permanent outer casing.

a. The annulus shall be sealed between the borehole and permanent outer casing at the installation of the permanent outer casing;

b. The bottom two (2) feet of the annulus shall be sealed between the bore hole and the permanent outer casing with sealing materials; and

c. The remainder of the annulus shall be filled with drill cuttings, sealing materials, native clay, or a combination of these materials.

3. Inner casing.

a. The entire annulus shall be sealed around the inner casing, including the annulus between the outer and inner casing;

b. The bottom two (2) feet of the annulus shall be sealed between the outer casing and the inner casing with sealing materials; and

c. The remainder of the annulus shall be filled with drill cuttings, sealing materials, native clay, or a combination of these materials.

Section 7. Wells Drilled in Unconsolidated Formations. (1) Borehole construction.

(a) The borehole diameter shall be a minimum of four (4) inches greater than the outside diameter of the well casing and screen; or

(b) Steel casing may be driven or advanced without over-drilling using the dry-driven grout method in accordance with Section 8(2) of this administrative regulation.

(c) Plumbness and alignment. The borehole shall:

a. Be sufficiently plumb and straight to receive well casing, liner, and screen without binding; and

b. Not interfere with the installation and operation of the pump.

(2) Casing installation.

(a) Single-cased wells. A minimum of twenty (20) feet of permanent casing shall be installed below finished ground surface excluding the screened interval.

(b) Multiple-cased wells.

1. Temporary outer casing.

a. The inside diameter of temporary outer casing shall be a minimum of four (4) inches greater than the outside diameter of the inner casing.

b. Temporary outer casing shall be removed prior to well completion.

2. Permanent outer casing. The inside diameter of permanent outer casing shall be a minimum of four (4) inches greater than the outside diameter of the inner casing.

3. Inner casing. A minimum of twenty (20) feet of permanent inner casing shall be installed below finished ground surface excluding the screened interval.

(3) Screen slot size shall prevent the entry of fine sediment or other harmful material into the well.

(4) Filter pack. The natural formation may be developed to serve as a filter pack, or an artificial filter pack shall be installed.

(a) The artificial filter pack shall:

1. Be sized to prevent the entry of fine sediment or other harmful material into the well;

2. Be disinfected prior to placement in the well, or disinfected in place; and

3. Extend a minimum of two (2) feet above the screen.

(b) Filter pack refill pipes may be installed if they:

1. Terminate above finished ground surface;

2. Are provided with a watertight cap; and

3. Are sealed in the annulus.

(5) Annular seal.

(a) The annulus shall be sealed in a manner that prevents the migration of groundwater and pollutants through the annulus and by:

1. Sealing the entire annulus with sealing materials;

2. Sealing the:

a. Two (2) feet of annulus directly above the filter pack with sealing materials; and

b. Remainder of the annulus with drill cuttings, sealing materials, native clay, or a combination of these materials; or

3. Using the method established in subparagraph 2. of this paragraph in combination with a mechanical packer.

(b) Single-cased wells.

1. The annulus shall be sealed by sealing the:

a. Entire annulus with sealing materials; or

b. (i) Two (2) feet of annulus directly above the filter pack with sealing materials; and

(ii) Remainder of the annulus with drill cuttings, sealing materials, native clay, or a combination of these materials.

2. The annular seal shall extend to a minimum depth of eighteen (18) feet below finished ground surface.

(c) Multiple-cased wells.

1. Temporary outer casing.

a. The bottom two (2) feet of the annulus shall be sealed above the filter pack with sealing materials; and

b. The remainder of the annulus shall be sealed below the temporary outer casing with drill cuttings, sealing materials, native clay, or a combination of these materials prior to removal of the temporary outer casing.

2. Permanent outer casing.

a. The bottom two (2) feet of the annulus shall be sealed between the borehole and permanent outer casing above the filter pack with sealing materials; and

b. The remainder of the annulus shall be sealed between the borehole and permanent outer casing with drill cuttings, sealing materials, native clay, or a combination of these materials at the installation of the permanent outer casing.

3. Inner casing.

a. The bottom two (2) feet of the annulus shall be sealed between the inner casing and outer casing with sealing materials; and

b. The remainder of the annulus shall be sealed between the inner casing and outer casing with drill cuttings, sealing materials, native clay, or a combination of these materials.

Section 8. Special Well Types. Wells in this classification shall include bored, driven, irrigation, and radial collector wells. (1) Bored well construction. Bored wells shall be constructed using the concrete-collar or the buried-slab method.

(a) The borehole diameter shall be a minimum of four (4) inches greater than the outside diameter of the well casing or precast concrete tiles used below the buried-slab or concrete-collar method.

(b) Casing materials for bored wells shall consist of pre-cast concrete tiles or corrugated fiberglass casing that meet the material construction standards established in Section 2 of this administrative regulation.

(c) Filter pack. The natural formation may serve as a filter pack, or an artificial filter pack may be installed in the annulus below the buried slab.

1. An artificial filter pack shall:

a. Be sized to prevent the entry of fine-grained sediment and other material into the well;

b. Be free from clay, silt, or other deleterious material;

c. Be disinfected prior to placement in the well; and

d. Not extend above the buried slab or concrete collar.

2, Filter pack refill pipes shall terminate above finished ground surface, shall be provided with a watertight cap, and shall be sealed in the annulus.

(d) Bored well construction using the buried-slab method.

1. The buried slab shall:

a. Be a minimum of ten (10) feet below ground surface;

b. Consist of reinforced concrete constructed without joints; and

c. Have a diameter sufficient to extend to the outer edge of the casing or tiles installed below the buried slab.

2. The top of the buried slab shall slope away from the center and shall provide a watertight joint where the buried slab rests on the well casing.

3. A coupling shall be cast in the buried slab in which to install the upper well casing.

4. The joint between the well casing and coupling shall be water tight.

5. A bentonite seal shall be:

a. Installed above the buried slab that extends the entire diameter of the borehole; and

b. A minimum of twelve (12) inches thick.

6. Upper well casing shall:

a. Be installed above the buried slab to extend a minimum of eight (8) inches above the ground surface;

b. Have an inside diameter of at least four (4) inches;

c. Conform to the requirements of Section 2 of this administrative regulation; and

d. Have only threaded or welded joints.

7. Pitless adapter.

a. A pitless adapter shall be installed so that it provides a leak-proof seal.

b. If a frost-free hydrant is installed, a Double Check Valve Backflow Preventer that meets the specifications of A.S.S.E. 1015-2011 Performance Requirements for Double Check Backflow Prevention Assemblies shall be installed between the pitless adapter and the frost-free hydrant.

8. The annulus fill for the upper casing above the bentonite seal shall consist of sealing materials or clean, inert earth materials.

9. A water-tight well cap shall be installed at the top of casing.

(e) Bored well construction with concrete-collar method.

1. The upper ten (10) feet of the borehole diameter shall be a minimum of six (6) inches greater than the outside diameter of the well casing.

2. The annular space in the upper ten (10) feet of the borehole between the excavation and the installed concrete collar casing shall be sealed with concrete or sealing materials.

3. The diameter of the borehole below the grouting shall be a minimum of four (4) inches greater than the outside diameter of the well casing.

4. The casing shall extend a minimum of eight (8) inches above the finished ground surface.

5. The cover slab shall be a minimum of four (4) inches thick.

6. A pipe sleeve shall be cast in place in the slab to accommodate the type of pump or pump piping to be used for the well.

7. A watertight joint shall be made where the slab rests on the well casing.

(2) Dry-driven grout method.

(a) General.

1. Steel casing may be driven using the dry-driven grout method.

2. PVC casing shall not be driven or pushed by force of the rig, either by direct hydraulic force or by hammer.

(b) A pilot hole shall be constructed a minimum of three (3) feet deep and a minimum of six (6) inches larger in diameter than the outside diameter of the casing to be driven.

(c) Casing installation.

1. Dry bentonite granules no less than fifty (50) mesh and no more than eight (8) mesh shall be poured into the pilot hole prior to driving the casing.

2. Bentonite shall continue to be poured into the pilot hole as the casing is driven and bentonite is drawn into the annulus.

(3) Driven point wells and jetted wells. Driven point wells and jetted wells shall be used for temporary dewatering purposes only.

(a) The well point, drive pipe, and joints shall be structurally suitable to prevent rupture or distortion during driving.

(b) Driven point wells shall have a water-tight cap.

(c) Driven point wells and jetted wells shall:

1. Not supply water for human consumption; and

2. Be abandoned in accordance with Section 11 of this administrative regulation.

(4) Radial collector wells.

(a) The certified water well driller shall submit plans for a proposed radial collector well to the cabinet and receive written approval prior to construction of a radial collector well.

(b) Factors that shall be considered for approval of a radial collector well include:

1. Depth of the well;

2. Types of formations;

3. The location of the well;

4. Sources of potential contamination in the area surrounding the well;

5. Intended use of the well; and

6. Planned or approved treatment schemes, if applicable.

(5) Irrigation wells.

(a) Irrigation wells shall be constructed with Double Check Valve Backflow Preventers that meet the specifications of the A.S.S.E. 1015-2011 Performance Requirements for Double Check Backflow Prevention Assemblies to prevent reverse flow of discharged water into the wellhead and aquifer.

(b) Reduced Pressure Backflow Preventers that meet the specifications of A.S.S.E. 1013-2011 Performance Requirements for Reduced Pressure Principle Backflow Preventers shall be installed:

1. Onto irrigation wells that are capable of pumping greater than ten thousand gallons per day or supplying groundwater to center pivot irrigation systems; and

2. In line between the final discharge point and the well discharge head.

Section 9. Well Finishing, Disinfection, and Testing. (1) Upper terminal. Upon well completion, the requirements established in this section shall be completed.

(a) Upper terminal. The casing shall be terminated:

1, A minimum of four (4) inches above finished ground surface and shall slope the ground surface away from the well; and

2. In a flood zone, a minimum of two (2) feet above the highest base flood elevation at the site.

(2) Newly installed water supply wells shall be developed until the column of water in the well is free of visible sediment.

(3) Disinfection. Wells shall be disinfected in accordance with the procedures established in this subsection.

(a) Determine the:

1. Feet of water in the well by subtracting the static water level from the total depth of the well;

2. Amount of chlorine disinfectant to use in order to provide a minimum chlorine concentration of 100 parts per million (ppm) in the well as established in this subparagraph.

a. For a four (4) inch-diameter well, there shall be a minimum of three (3) cups of chlorine bleach or two (2) ounces of hypochlorite granules per 150 feet of water in the well.

b. For a six (6) inch-diameter well, there shall be a minimum of three (3) cups of chlorine bleach or two (2) ounces of hypochlorite granules per seventy-five (75) feet of water in the well.

c. For an eight (8) inch-diameter well, there shall be a minimum of three (3) cups of chlorine bleach or two (2) ounces of hypochlorite granules per fifty (50) feet of water in the well.

d. For a twenty-four (24) inch-diameter well, there shall be a minimum of eight (8) cups of chlorine bleach or five (5) ounces of hypochlorite granules per ten (10) feet of water in the well; and

(b) Chlorine disinfection procedure.

1. Introduce the chlorine or hypochlorite granules into the well;

2. Circulate the chlorine solution throughout the well for a minimum of thirty (30) minutes, ensuring that the chlorinated water contacts all parts of the well casing, borehole, discharge pipes, and all internal well components;

3. Allow chlorinated water to stand in the well for a minimum of thirty (30) minutes;

4. After the chlorinated water solution has stood in the well for a minimum of thirty (30) minutes, purge the well of all chlorinated water; and.

5. Chlorinated water shall:

a. Be discharged to the ground in a manner that prevents environmental harm; and
b.Not be discharged to a surface water body.

(4) A sanitary seal or watertight well cap shall be installed.

(5) Vents. (a) A vent shall consist of a pipe:

1. That extends above the top of the well and above base flood elevation;

2. With the open end turned down; and

3. The open end shall be covered with twenty-four (24) mesh or finer screen of durable material.

(b) For wells with naturally occurring methane, a vent shall be installed.

(6) Bacteriological sampling.

(a) A well for potable use shall be analyzed for E. coli within thirty (30) days of the completion of the well.

(b) The sample shall not be collected until all residual chlorine has been purged from the well.

(c) Sample containers shall be sterile glass or plastic.

(d) Samples for E. coli shall be:

1. Delivered to the laboratory within six (6) hours of the time they are collected;

2. Kept at four (4) degrees Centigrade (forty (40) degrees Fahrenheit) until delivered to the laboratory; and

3, Analyzed at a laboratory certified in accordance with 401 KAR 8:040.

Section 10. Well Modification. (1) General. A water supply well being modified shall be brought into compliance with this administrative regulation.

(2) Well pits.

(a) A new well pit shall not be constructed, and an existing well pit shall not be modified.

(b) If a well is being modified, the:

1. Existing well pit shall be eliminated; and

2 Casing shall be extended a minimum of four (4) inches above the finished ground surface.

(c) 1. Flooring and the walls of the pit shall be broken and removed; and

2. The pit shall be filled with compacted earth.

(3) Finishing and testing. The well shall be:

1. Finished; and

2. Tested for E. coli in accordance with Section 9(6) of this administrative regulation.

(4) Within sixty (60) days of modification of a well, the certified water supply well driller shall submit a Uniform Kentucky Well Maintenance and Plugging Record to the well owner and the cabinet as established in Section 1 of this administrative regulation.

Section 11. Well Abandonment. (1) Well unsuitable for its intended use. A water supply well that has been damaged, or is otherwise unsuitable for use as a water supply well, shall be abandoned within thirty (30) days from the date it is determined that the well is no longer suitable for its intended use.

(a) Water supply wells shall be abandoned in a manner that prevents the migration of:

1. Surface water or contaminants to the subsurface; and

2, Contaminants among water bearing zones.

(b) A record of the abandonment of a water supply well shall be submitted by the certified water supply well driller on the Uniform Kentucky Well Maintenance and Plugging Record to the cabinet within sixty (60) days from the date abandoned.

(2) Well preparation for abandonment.

(a) Measurements. Prior to abandoning a water supply well, the certified water supply well driller shall record the measurements established in subparagraphs 1 through 3 of this paragraph on the Well Maintenance and Plugging Record:

1. Well depth;

2. Well diameter; and

3. Depth to static water level.

(b) Obstructions.

1. All obstructions shall be removed from the well prior to abandoning; or

2. If the pump or equipment is stuck in the well and cannot be removed, the material shall be pushed to the bottom of the well as far as possible.

(c) The well shall be disinfected as established in Section 9(3) of this administrative regulation.

(3) Drilled wells.

(a) Well casing, screen, and liner removal.

1. All well casing, screens, and liners:

a. Shall be removed from the well prior to placing the sealing material by pulling or overdrilling; and

b. May be removed simultaneously with the introduction of sealing material if necessary to avoid borehole collapse.

2.a. If the well casing has been grouted in place and the casing cannot be removed, the casing may be cut off a minimum of five (5) feet below the ground surface.

b. The well shall be filled with sealing materials or inert earth materials from the bottom of the well to a minimum of twenty (20) feet below the ground surface.

c. The remainder of the well shall be filled with sealing materials to a minimum of five (5) feet below the ground surface.

d. The uppermost five (5) feet of the well shall be filled with sealing materials or other inert earth material suitable to land use at the site.

(b) Sealing material placement.

1. The well or borehole shall be filled:

a. With sealing materials or other inert materials from the bottom to a minimum of twenty (20) feet below the ground surface; and

b. So that all voids are completely filled and in a manner that prevents bridging across the well or well bore.

2. The well or borehole shall be filled with sealing materials from a minimum of twenty (20) feet below ground surface to a minimum of five (5) feet below the ground surface in a manner that prevents the migration of pollutants along the well or well bore.

3. Sealing materials, clay, or other inert material suitable to the proposed land use shall be used to fill the upper five (5) feet or less of a well being abandoned.

(4) Wells with multiple casing. The innermost well casing, screen, or liner shall be removed first and the well filled up to the level of the bottom of the next outer casing before removing the next outer casing.

(a) Voids. The well or borehole shall be filled with sealing materials or other inert materials from the bottom of the well to a minimum of five (5) feet below the bottom of a void.

1. A packer, expansion bridge, or other support shall be placed at the top of the void.

2. A permanent bridge consisting of a minimum of ten (10) feet of sealing materials shall be placed above the expansion bridge.

(b) 1. The remainder of the well or borehole shall be plugged with sealing materials or other inert materials from the bottom to a minimum of twenty (20) feet below the ground surface; and

2. The well or borehole shall be filled with sealing materials from a maximum of twenty (20) feet below the ground surface to a minimum of five (5) feet below the ground surface.

(c) Sealing materials, clay, or other inert material suitable to the proposed land use shall be used to fill the upper five (5) feet or less of a well being abandoned.

(5) Bored wells.

(a) The well shall be filled with sealing materials, dense grade aggregate, limestone sand, or native clay from the bottom of the well to a maximum of five (5) feet below finished ground surface.

(a) The well shall be filled with sealing materials, dense grade aggregate, limestone sand, or native clay from the bottom of the well to a maximum of five (5) feet below finished ground surface.

(b) The upper five (5) feet of well casing, tiles, or other well-wall material shall be removed. A minimum one (1) foot thick concrete surface seal shall be poured and allowed to cure for twenty-four (24) hours. The uppermost five (5) feet of the borehole shall be filled with clay or an inert material appropriate to the intended use of the land.

(6) Driven wells.

(a) Well casing and screens shall be removed and sealing materials shall be introduced from the bottom of the well to a maximum five (5) feet below finished ground surface. A minimum one (1) foot thick concrete surface seal shall be poured and allowed to cure for twenty-four (24) hours.

(b) Sealing materials, clay, or other inert material suitable to the proposed land use shall be used to fill the upper five (5) feet or less of a well being abandoned.

(7) Flowing artesian wells.

(a) Flowing artesian wells or wells in which there is upward movement of water between aquifers shall be plugged with neat cement grout that is pumped under pressure and mixed with the minimum quantity of water that will permit handling.

(b) Artesian flow may be restricted if necessary.

(c) A well packer, cast-iron plug, or temporary bridge shall be placed at the bottom of the confining formation immediately overlying the artesian water-bearing horizon to seal off the flow.

(8) Hand dug wells.

(a) The pumps, casing, and equipment shall be removed, and the well surface pad shall be demolished.

(b) The well shall be filled from the bottom to the top with clean rock, gravel, or sand to within five (5) feet of the ground surface.

(c) The poured concrete surface seal shall be:

1. A minimum of one (1) foot thick; and

2. Allowed to cure for twenty-four (24) hours before finishing to the ground surface.

(d) The remaining three (3) feet or less of annular space shall be filled from the top of the surface seal to the ground surface with clean soil or other appropriate surface material.

(9) Within sixty (60) days after a water well has been abandoned, the certified water supply well driller shall complete and submit a Uniform Kentucky Well Maintenance and Plugging Record to the well owner, if known, and to the cabinet.

Section 12. Incorporation by Reference. (1) The following material is incorporated by reference:

(a) "Uniform Kentucky Well Construction Record", DEP No. DOW6010, July 2019;

(b) "Water Well Owner’s Guide", Kentucky Energy and Environment Cabinet, DEP No.

DOW6020, September 8, 2009;

(c) "Kentucky Water Well Variance Request", DEP No. DOW6030, July 2019;

(d) "Uniform Kentucky Well Maintenance and Plugging Record", DEP No. DOW6040, Month 2019;

(e) Water Well Bacterial Report and Chain of Custody form, DEP No. DOW6050, July 2019;

(f) American Society for Testing and Materials (A.S.T.M.) Specification D1784-11, "Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds", 2011;

(g) American Society for Testing and Materials (A.S.T.M.) Specification F480-14, "Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80", 2014;

(h) National Sanitation Foundation (N.S.F.) Standard 14-2018, "Plastics Piping System Components and Related Materials", June 2018;

(i) National Sanitation Foundation (N.S.F.) Standard 61-2018, "Drinking Water System Components – Health Effects", February 2018; and

(j) American Society of Sanitary Engineering (A.S.S.E.) 1015-2011, "Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies", August 2011.

(k) American Society of Sanitary Engineering (A.S.S.E.) 1013-2011, "Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers", August 2011.

(2) This material may be inspected, copied, or obtained, subject to applicable copyright law, at the Division of Water, 300 Sower Boulevard, Frankfort, Kentucky 40601, Monday through Friday, 8 a.m. to 4:30 p.m. The material in subsection (1)(a) through (d) of this section is also available on the Division of Water Web site, https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/default.aspx.

(3)(a) American Society for Testing and Materials (A.S.T.M.) Specification D1784-11, "Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds", 2011, may also be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA, 19428-2949; Phone 1-610-832-9585.

(b) American Society for Testing and Materials (A.S.T.M.) Specification F480-14, "Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80", 2014, may also be obtained from the American Society for Testing Materials, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA, 19428-2949; Phone 1-610-832-9585.

(c) National Sanitation Foundation (N.S.F.) Standard 14-2018, "Plastics Piping System Components and Related Materials", June 2018, may also be obtained from the National Sanitation Foundation International, P.O. Box 130140, 789 N. Dixboro Road, Ann Arbor, MI, 48105; Phone 1-800-673-6275.

(d) National Sanitation Foundation (N.S.F.) Standard 61-2018 "Drinking Water System Components – Heath Effects", February 2018, may also be obtained from the National Sanitation Foundation International, P.O. Box 130140, 789 N. Dixboro Road, Ann Arbor, MI, 48105; Phone 1-800-673-6275.

(e) American Society of Sanitary Engineering (A.S.S.E.) 1015-2011, "Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies", August 2011, may also be obtained from the American Society of Sanitary Engineering, 18927 Hickory Creek Drive, Suite 220, Mokena, IL, 60448;

Phone (708) 995-3019.

(f) American Society of Sanitary Engineering (A.S.S.E.) 1013-2011, "Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers", August 2011, may also be obtained from the American Society of Sanitary Engineering, 18927 Hickory Creek Drive, Suite 220, Mokena, IL, 60448; Phone (708) 995-3019. (11 Ky.R. 1950; Am. 12 Ky.R. 144; eff. 8-13-1985; 17 Ky.R. 2762; 3142; eff. 5-22-91; TAm eff. 8-9-2007; 35 Ky.R. 587; 798; eff. 10-8-2008; TAm eff. 7-8-2016; Crt eff. 9-5-2018; 46 Ky.R. 631, 1468; eff. 1-3-2020.)